Annals of Clinical and Analytical Medicine
Original Research

A comparison of allergic and non-allergic rhinitis in Sanliurfa province: Evaluating allergen sensitization patterns

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Abstract

Aim: Rhinitis is an inflammation of the nasal mucosa that presents symptoms such as itching, sneezing, and nasal congestion that persist for two or more consecutive days. Our study aimed to compare clinical characteristics between allergic and non-allergic rhinitis in Sanlıurfa, Turkey, and characterize sensitization patterns specific to the region's unique climate.

Material and Methods: We collected data using a questionnaire from patients at face-to-face outpatient visits. Skin prick tests and specific IgE were performed to diagnose allergic rhinitis (AR) and non-allergic rhinitis (NAR).

Results: The study included 297 rhinitis patients, of whom 157 (52.8%) were male, with a median age of 30 years (IQR, 25-36). The most common complaint was nasal discharge, reported by 162 (54.4%) patients, followed by sneezing in 96 (32.1%). Skin prick testing and allergen-specific IgE were positive in 178 (59.9%) patients. We found that AR prevailed over NAR, with grass and cereal pollens being the predominant allergens. The prevalence of moderate-severe rhinitis was high, with no significant difference in severity between the allergic and non-allergic groups. Asthma co-occurrence was more common in AR patients.

Discussion: Our findings underscore the importance of tailoring skin prick test panels to the region's allergen profile for accurate diagnosis. Expanding the allergen panel could prove beneficial in accurately determining the prevalence of true AR.

Keywords

Allergic Rhinitis, Non-Allergic Rhinitis, Allergen Sensitization, Skin Prick Test

DOI: 10.4328/ACAM.22242 Received: 2024-05-02 Accepted: 2024-06-03 Published Online: 2024-08-14 Printed: 2024-09-01 Ann Clin Anal Med 2024;15(9):621-625
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This study was approved by the Ethics Committee of Harran University, Medical School (Date: 2018-9-13, No:7820)

Introduction

Rhinitis is an inflammatory condition of the nasal mucosa that manifests with symptoms such as itching, sneezing, rhinorrhea, and nasal congestion, persisting for two or more consecutive days, often lasting for more than one hour [1]. Other commonly observed symptoms include postnasal drip, frequent throat clearing, cough, fatigue, and irritability. Chronic rhinitis is characterized by symptomatic nasal inflammation that persists for at least 12 weeks per year.

Allergic rhinitis (AR) is a clinical form of chronic rhinitis accompanied by an immunoglobulin E (IgE)-related immune response. Skin prick testing (SPT) or the assessment of allergen-specific IgE (sp-IgE) levels in the blood is essential for diagnosing AR. Non-allergic rhinitis (NAR) refers to a varied group of rhinitis without any clinical signs of infection, such as discolored secretions or systemic evidence of allergic inflammation indicated by the absence of allergen-specific IgE or negative SPT with inhalant allergens. Subgroups of NAR include drug-induced rhinitis, rhinitis in the elderly, hormonal rhinitis such as that induced by pregnancy, nonallergic occupational rhinitis, gustatory rhinitis, and idiopathic rhinitis.

Allergic rhinitis is the most prevalent form of chronic rhinitis, affecting 10-30% of adults and 40% of children[2]. The prevalence of AR has been reported to be 5% to 50% worldwide [3]. The number of studies conducted on the prevalence of AR in the adult age group is limited. The European Community Respiratory Health Survey (ECRHS), conducted in 22 countries with 48 centers among individuals aged 20-44 in the 1990s, reported an AR prevalence of 20.9%, varying frequencies ranging from 9.5% to 40.9% in different countries[4]. Allergic rhinitis prevalence varies globally, ranging from 3.3% in former Soviet countries to 36% in Japan [5-11]. Some reports using the ECRHS method defined the variable rates of AR in adult patients from different regions of Turkey as follows: 22.7%, 14.5%, 16.5%, 2.5%, and 1.6% [12-15].

Traditionally (old classification), allergic rhinitis was categorized as either seasonal or perennial. However, this classification hasn't always aligned with epidemiological findings due to difficulties distinguishing between seasonal and perennial symptoms. Factors contributing to this include constant exposure to allergens throughout the year, multiple sensitizations in patients, regional differences in allergen levels, and the influence of environmental irritants. Consequently, Allergic Rhinitis and its Impact on Asthma (ARIA) proposed replacing the term seasonality with intermittent and persistent rhinitis[16-18].

This study was designed to compare the clinical characteristics of allergic and non-allergic rhinitis in Sanlıurfa, Turkey's warmest city. Additionally, we aimed to characterize the sensitization patterns of AR specific to this region's unique climate.

Material and Methods

This study was conducted at a tertiary hospital in southeast Turkey, involving patients presenting with symptoms indicative of rhinitis, as confirmed by an ear-nose throat examination. Chronic rhinitis, AR, and NAR are diagnosed according to guidelines. The diagnosis and classification of allergic rhinitis followed the guidelines outlined in the Allergic Rhinitis and its Impact on Asthma (ARIA) framework. All subjects underwent skin prick testing, utilizing an inhalant allergy panel comprising 18 allergens. The inhalant allergy panel encompassed diverse allergens, including pollens (mixture of tree I and 2, mixture of grass pollen and cereals, and weed pollen), house dust mites, and storage mites (Acarus siro, Tyrophagus putrescentiae, Lepidoglyphus destructor), animal epithelium (dog, cat, cow), Blatella germanica, and molds (Aspergillus, Cladosporium, Alternaria alternata) (ALK, Abello, Spain). In cases where the feasibility of skin testing was compromised, allergen-specific IgE levels were quantified employing ImmunoCAP® Phadiotop. Sp-IgE levels were measured in accordance with the recommendation of the manufacturer (ImmunoCAP®, Thermo Scientific, Uppsala, Sweden). Sp-IgE measurements >0.35 kU/L were considered positive. A comprehensive assessment for comorbidities, encompassing asthma, drug allergies, other allergic conditions, and nasal surgery was systematically performed. Subsequent to the skin testing, patients underwent further scrutiny to ascertain the concordance between allergy test outcomes and observed symptomatic manifestations.

Statistics

All data were analyzed using the SPSS statical software package version 22. (IBM Corp., USA) and GraphPad Prism 8 (GraphPad Software Inc. San Diego, California, USA). Median and interquartile range (IQR) values for continuous variables and the frequency and percentage for the categorical variables were calculated. Differences between ordinal data were evaluated with the Mann-Whitney-U test and the Kruskal-Wallis test. Categorical variables were evaluated with the 2 tailed Chi-square or Fisher exact tests. A p-value <0.05 was considered the significance level for differences.

Ethics Approval

This study was conducted using a questionnaire administered face-to-face to patients during their visits to the outpatient clinic. It was approved by the Ethics Committee of Harran University of Medical School (Date: 2018-9-13, No:7820). All patients signed the written informed consent form.

Results

The study included 297 chronic rhinitis patients, of whom 157 (52.8%) were male, with a median age of 30 years (IQR, 25-36). The most common complaint was nasal discharge, reported by 162 (54.4%) patients, followed by sneezing in 96 (32.1%). The median duration of rhinitis was 48 months (IRQ;24-91). Skin prick testing and allergen-specific IgE were positive in 178 (59.9%) patients. Allergen-specific IgE was performed in 72 patients, yielding positive results in 39 (54.1%) cases. Table 1 illustrates the demographic and clinical characteristics of all chronic rhinitis patients.

Rhinitis symptoms were perennial in 207 (69.7%) patients, while 116 (39%) reported seasonal variability in their symptoms. The most common accompanying comorbidity was asthma diagnosed in 40 (13.4%) patients. Pruritus was the second most common comorbidity, followed by drug allergies. A family history of asthma or rhinitis was present in 82 (27.6%) patients. Nasal surgery had been performed in 24 (8.08%) patients. (see details in Table 1). Forty-four patients (14%) identified specific triggers, while the majority did not recognize specific triggers.

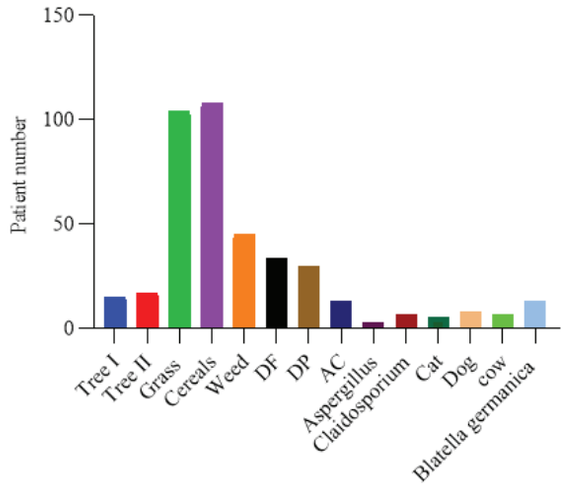

Figure 1. The results of skin prick testing in AR patients. (DP:Dermatophagoides pteronyssinus, DF:Dermatophagoides farinae, AC: Acarus siro)

Table 1. The demographic and clinical characteristics of all chronic rhinitis patients

Number of patients	297
Age, years, median (IQR)	30 (25-36)
Gender, Female (%)	140 (47.1)
Duration of rhinitis, months (IQR)	48 (24-91)
Primary complaint, n (%)	
Rhinorrhea	162 (54.5)
Sneezing	96 (32.1)
Nasal congestion	39 (13.1)
Allergy testing, n,(%)	
Skin prick testing	225
Positivity	154 (68.4)
Negativity	71 (32.6)
Results of allergen-specific IgE, n (%)	72
Negative Phadiotop	33 (45.8)
Positive Phadiotop	39 (54.2)
Results of SPT, n (%)	154
Monosensitization	104 (67.5)
Polisensitization	50 (32.5)
Results of SPT, n (%)	
Pollen positivity	128 (83.1)
Mite positivity	52 (33.7)
Mold positivity	8 (5.1)
Animal dander positivity	28 (18.1)
Classification of rhinitis (old)	
Seasonal	88 (29.6)
Perennial	209 (70.3)
Classification of rhinitis (ARIA)	
Intermittent	95 (31.9)
Persistent	202 (68.1)
Severity of rhinitis, n (%)	
Mild	112 (37.7)
Moderate- severe	185 (62.3)
Comorbidities, n (%)	
Asthma	40 (13.4)
Pruritus	17 (5.7)
Drug allergy	9 (3)
Food allergy	2 (0.6)
Nasal surgery	24 (8)

According to the old classification, seasonal rhinitis was present in 88 (29.6%) patients, whereas perennial rhinitis was found in 209 (70.4%). According to the ARIA guidelines, persistent rhinitis was diagnosed in 202 (68.1%) cases. Most patients presented with moderate/severe rhinitis, totaling 185 (62.2%). Allergic rhinitis was diagnosed in 178 (59.9%) of the patients, with the AR group displaying a younger average age compared to the NAR group. Seasonal rhinitis was statistically more common in patients with AR, while seasonal variability was more pronounced in patients with NAR. SPT was performed in 225 patients and of 154 (68.4%) had at least one positive result. Grass pollens (104 patients, 67%) and cereals (108 patients, 70%) were the allergens most frequently detected in SPT. The results of the SPT are summarized in Figure 1. Figures 2a and 2b depict the classification of patients with AR and NAR according to the old and ARIA classifications, respectively. There were no significant differences in presenting complaints between patients with AR and NAR. The rate of disease severity was similar between the AR and NAR groups. Asthma was more frequently observed in the AR group (p=0.015). Table 2 provides a detailed comparison between the AR and NAR groups.

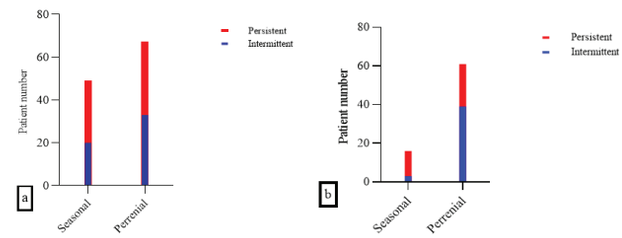

Figure 2. 2a. The categorization of AR patients following old and ARIA classification, and Figure 2b. The classification of NAR patients

Table 2. Comparison of allergic rhinitis vs non-allergic rhinitis

Patients number, (n,%)	AR (n=178, 60 %)	NAR (n=118, 40%)	p
Age, median (IQR)	29 (24-34)	31 (26-38)	0.007
Gender, Female	77 (55 %)	63 (45%)	0.1
Duration of rhinitis, months, IOR	48 (24-96)	48 (24-72)	0.23
Classification of rhinitis, (old) n (%)			
Seasonal	69 (38.7)	19 (15.9)	<0.001
Perennial	109 (61.3)	100 (84.1)	
Classification of rhinitis (ARIA)			
Intermittent	53 (29.7)	42 (35.2)	0.37
Persistent	125 (70.3)	77 (64.7)	
Seasonal variability			
Related to season	89 (76.7)	27 (23.2)	<0.001
No symptoms in winter	74 (77)	22 (23)	<0.001
Severity of rhinitis			
Mild	62 (34.8)	50 (42)	0.22
Moderate-Severe	116 (65.2)	68 (58)	
Comorbidities, n (%)			
Asthma	31 (17.4)	9 (7.5)	0.015
Pruritus	10 (5.6)	7 (5.8)	1
Drug allergy	7 (3.9)	2 (1.6)	0.3
Food allergy	0	2 (1.6)	0.1
Nasal surgery	10 (5.6)	14 (11.7)	0.08
Family history	54 (30.3)	28 (23.5)	0.2

Discussion

In this study, we observed that the prevalence of allergic rhinitis was higher than that of non-allergic rhinitis. The average age of patients with AR was lower than those with NAR. The most common complaint among chronic rhinitis patients was nasal discharge. Asthma was more common among patients with allergic rhinitis than NAR. In this warm province, grass pollens and cereals were the allergens most frequently detected.

Backert et al. have reported that allergic rhinitis is three times more common than non-allergic rhinitis. Their study involved 4959 adult rhinitis patients, and allergic rhinitis patients complained more frequently of runny nose, sneezing, and eye symptoms [17]. In another study in Turkey, the AR prevalence was 65,5% and more common than NAR (35.5%)[19]. Our findings on the frequency of AR (60%) and the primary complaint align with results from other studies.

Various studies have reported that the intermittent/persistent classification is fundamentally different from the seasonal/perennial classification and does not reflect the same disease characteristics. In a population of over 3000 patients, it was demonstrated that 55% of patients with seasonal symptoms had intermittent rhinitis, while 55% of patients with persistent rhinitis had year-round allergies[20]. Therefore, the terms 'intermittent' and 'persistent' cannot be used interchangeably with 'seasonal' and 'perennial'[18]. In our study, persistent rhinitis was diagnosed in 71% of patients with seasonal rhinitis and 70 % of patients with perennial rhinitis. The higher rates may be attributed to a higher prevalence of pollen sensitization and variations in pollen distribution across the region.

According to the ARIA classification, the severity of AR is categorized as 'mild' or 'moderate-severe' based on the intensity of symptoms and the impact on the patient's activities and quality of life [16, 18]. In individuals with moderate-severe perennial allergic rhinitis (AR), the quality of life is significantly compromised compared to healthy subjects, and this impairment is known to be similar to the restrictions observed in patients with moderate to severe asthma[16]. It has been demonstrated that patients with moderate to severe persistent AR, experiencing a substantial impact on their quality of life, require long-term treatment. Additionally, it has been observed that individuals with moderate-severe persistent AR exhibit higher bronchial hyperresponsiveness and asthma frequency compared to those with mild intermittent AR [21]. In our study, the prevalence of moderate-severe rhinitis was 62.5%, with no significant difference in severity between the AR and NAR groups. This may suggest that most patients with moderate-severe rhinitis seek treatment at outpatient clinics.

In terms of comorbidities, we found that asthma is more common in AR patients than in NAR (17% vs. 7.5%). The frequency of asthma ranges from 10% to 40% in AR patients, while the prevalence of AR in asthma patients is reported to be 60% to 80% [22]. The co-occurrence of asthma is more common in individuals with moderate-severe persistent allergic rhinitis than in those with mild intermittent allergic rhinitis. In a study conducted in Iran, the prevalence of asthma was reported as 12% in AR patients, and it was stated that all of these patients were in the persistent AR group (15). In our study, the overall prevalence of asthma among chronic rhinitis patients was 13.5%, which is consistent with findings from other studies. Nevertheless, there was no difference in the co-occurrence of asthma between persistent and intermittent rhinitis, as well as in the severity of AR. However, a history of nasal surgery was the second most prevalent comorbidity among chronic rhinitis patients, occurring more frequently in those with NAR than in AR.

Turkey consists of different geographic features and climate types that affect the distribution of allergen sensitization. Sanlıurfa is located between latitudes 37° 09' N and 37° 27' N and longitudes 38° 47' E and 39° 19' E. Positioned at an elevation of 457 meters, the city experiences a semi-arid, temperate continental climate characterized by moderate temperatures. The most commonly detected inhalant allergens were grass mix (67%) and cereals (70%) in this region in AR patients. In a study in Malatya, among the patients with only AR, the most common aeroallergen was grass mix (75.1%), followed by weed mix (18%) and house dust mite (12.3%)[23]. Aeroallergen sensitization studies conducted in nearby regions of Urfa showed that sensitization to weed-cereal pollen is the most common in Elazığ, and sensitization to grass pollen is the most common in Diyarbakır and Mardin [24, 25]. Due to the significant aridity in the region, the notably low humidity levels may explain our results in SPT, which showed a low positivity rate (19%) for house dust mites.

Our study had some limitations. Firstly, both SPT and serum-specific IgE tests have their limitations. Not all potential allergens can be tested, and only those deemed relevant are selected for testing. However, our inhalant allergy panel includes 18 allergens, covering a broad range of common airborne allergens. The clinical significance of any detected sensitization should be verified through medical history and/or allergen provocation tests. Local allergic rhinitis (LAR) is characterized by the presence of allergic rhinitis symptoms in patients with negative SPT and serum-specific IgE against inhaled allergens. It accounts for approximately 25% of all rhinitis prevalence. The diagnosis of local allergic rhinitis is primarily based on nasal allergen provocation testing (NPT) to demonstrate local concentrations of sIgE. Second, we were unable to conduct NPT and nasal-specific IgE assessments in patients who tested negative on the SPT, which means some patients categorized as having NAR might actually belong to the LAR group. However, implementing these methods is not always easy and feasible.

Conclusion

In conclusion, our study offers valuable insights into allergens and sensitization profiles within Sanlıurfa province. Within this warm climate, grass and cereal pollens emerge as the predominant allergens triggering allergic rhinitis. Moreover, allergic rhinitis prevails more frequently than non-allergic rhinitis, and the composition of skin prick test panels should be tailored to the region's allergen profile. Expanding the allergen panel could prove beneficial in accurately determining the prevalence of true AR.

Acknowledgment

The authors express infinite gratitude to the patients for their collaboration.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents

and approval of the final version of the article.

Animal and Human Rights Statement
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or compareable ethical standards.

Funding: *None*

Conflict of Interest
The authors declare that there is no conflict of interest.

References
1. Brożek JL, Bousquet J, Agache I, Agarwal A, Bachert C, Bosnic-Anticevich S, et al. Allergic rhinitis and its impact on asthma (aria) guidelines-2016 revision. J Allergy Clin Immunol. 2017;140(4):950-958.
2. Wallace DV, Dykewicz MS, Bernstein DI, Blessing-Moore J, Cox L, Khan DA, et al. The diagnosis and management of rhinitis: An updated practice parameter. J Allergy Clin Immunol. 2008;122(2 Suppl):S1-84.
3. Wise SK, Damask C, Roland LT, Ebert C, Levy JM, Lin S, et al. International consensus statement on allergy and rhinology: Allergic rhinitis - 2023. Int Forum Allergy Rhinol. 2023;13(4):293-859.
4. Burney P, Chinn S, Jarvis D, Luczynska C, Lai E. Variations in the prevalence of respiratory symptoms, self-reported asthma attacks, and use of asthma medication in the European Community Respiratory Health Survey (ECRHS). Eur Respir J. 1996;9(4):687-95.
5. Zhang Y, Zhang L. Increasing prevalence of allergic rhinitis in China. Allergy Asthma Immunol Res. 2019;11(2):156-169.
6. Nugmanova D, Sokolova L, Feshchenko Y, Iashyna L, Gyrina O, Malynovska K, et al. The prevalence, burden, and risk factors associated with bronchial asthma in the commonwealth of independent states countries (Ukraine, Kazakhstan, and Azerbaijan): Results of the CORE study. BMC Pulm Med. 2018;18(1):110-122.
7. Ma T, Wang X, Zhuang Y, Shi H, Ning H, Lan T, et al. Prevalence and risk factors for allergic rhinitis in adults and children living in different grassland regions of Inner Mongolia. Allergy. 2020;75(1):234-239.
8. Nam JS, Hwang CS, Hong MP, Kim KS. Prevalence and clinical characteristics of allergic rhinitis in the elderly Korean population. Eur Arch Otorhinolaryngol. 2020;277(12):3367-3373.
9. Yamamoto-Hanada K, Yang L, Ishitsuka K, Ayabe T, Mezawa H, Konishi M, et al. Allergic profiles of mothers and fathers in the Japan Environment and Children's Study (JECS): A nationwide birth cohort study. World Allergy Organ J. 2017;10(1):24-31.
10. Fedoseev GB, Emel'ianov AV, Sergeeva GR, Ivanova NI, Zibrina TM, Maksimenko IN, et al. Rasprostranennost' bronkhial'noĭ asatmy i allergicheskogo rinita sredi vzroslogo naseleniia Sankt-Peterburga [Prevalence of bronchial asthma and allergic rhinitis in the adult population of St. Petersburg]. Ter Arkh. 2003;75(1):23-29.
11. Bauchau V, Durham SR. Prevalence and rate of diagnosis of allergic rhinitis in Europe. Eur Respir J. 2004;24(5):758-64.
12. Dinmezel S, Ogus C, Erengin H, Cilli A, Ozbudak O, Ozdemir T. The prevalence of asthma, allergic rhinitis, and atopy in Antalya, Turkey. Allergy Asthma Proc. 2005; 26(5):403-9.
13. Sakar A, Yorgancioglu A, Dinc G, Yuksel H, Celik P, Dagyildizi L, et al. The prevalence of asthma and allergic symptoms in Manisa, Turkey (A western city from a country bridging Asia and Europe). Asian Pac J Allergy Immunol. 2006;24(1):17-25.
14. Topuz B, Kara CO, Ardiç N, Zercir M, Kadiköylü S, Tümkaya F. Denizli il merkezindeki erişkin nüfusta alerjik rinit görülme sikliği [The prevalence of allergic rhinitis in the adult urban population of Denizli]. Kulak Burun Bogaz Ihtis Derg. 2005;14(5-6):106-109.
15. Talay F, Kurt B, Tug T, Kurt OK, Goksugur N, Yasar Z. The prevalence of asthma and allergic diseases among adults 30-49 years of age in Bolu, Western Black Sea Region of Turkey. Clin Ter. 2014;165(1):59-63.
16. Bousquet, J, Cauwenberge PV, Khaltaev N. Allergic rhinitis and its impact on asthma. J Allergy Clin Immunol. 2001;108 (5 Suppl):S147-334.
17. Bousquet J, Anto JM, Bachert C, Baiardini I, Bosnic-Anticevich S, Canonica G, et al. Allergic rhinitis. Nat Rev Dis Primers. 2020;6(1):95-112.
18. Bousquet J, Khaltaev N, Cruz AA, Denburg J, Fokkens WJ, Togias A, et al. Allergic rhinitis and its impact on asthma (ARIA) 2008 update (in collaboration with the World Health Organization, GA(2)LEN and AllerGen). Allergy. 2008;63(Suppl 86):8-160.
19. Sözener ZÇ, Beyaz Ş, Soyyıgıt Ş. Allergic and nonallergic rhinitis according to symptoms: A retrospective chart review. Asthma Allergy Immunology. 2022;20:114-119.
20. Demoly P, Allaert FA, Lecasble M, Bousquet J. Validation of the classification of ARIA (allergic rhinitis and its impact on asthma). Allergy. 2003;58(7):672-5.
21. Wang Y, Chen H, Zhu R, Liu G, Huang N, Li W, et al. Allergic Rhinitis Control Test questionnaire-driven stepwise strategy to improve allergic rhinitis control: A prospective study. Allergy. 2016;71(11):1612-1619.
22. Wise SK, Lin SY, Toskala E, Orlandi RR, Akdis A, Alt JA, et al. International consensus statement on allergy and rhinology: Allergic rhinitis. Int Forum Allergy Rhinol. 2018;8(2):108-352.
23. Ozdemir E. Sensitization to common aeroallergens in the atopic population of Malatya Province, Turkey: A retrospective analysis using skin prick test. Ann Med Res. 2022;29(9):962-967.
24. Demir M, Kaya H, Şen H, Taylan M, Yilmaz S, Dalli A, et al. Evaluation of prick test results in patients with respiratory tract allergic symptoms in Diyarbakir district. Göğüs Hastanesi Derg. 2015;29(2):61-66.
25. Cansever M, Oruc C. Aeroallergens sensitization in an allergic pediatric population of Stone City (Mardin), Turkey: Is it compatible with the previous atmospheric distribution analysis?. Ann Med Res. 2022;29(3):222-227.

How to cite this article:
Esra Karabıber. *A comparison of allergic and non-allergic rhinitis in Sanliurfa province: Evaluating allergen sensitization patterns. Ann Clin Anal Med 2024;15(9):621-625*

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